



64-BIT SoC Family **RENESAS R-CAR V3H**



Best-in-Class ASIL B/C System-on-Chip, 7,2 TOPS for Intelligent Camera Applications

R-Car V3H Delivers Best-in-Class TOPS/Watt for Cutting-Edge Computer Vision, Supports the latest NCAP 2020 requirements, including Driver Monitoring Systems and provide a migration path toward NCAP 2025. Building on the state-of-the-art recognition technology introduced with the R-Car V3H in February 2018, which includes integrated IP for convolutional neural networks (CNN), the updated R-Car V3H delivers 4 times the performance for CNN processing compared to the earlier version and is achieving up to overall 7.2 TOPS processing including all Computer Visions IPs while maintaining low power consumption levels.

INPUT Camera Se

Target Applications

- Front Stereo Smart Camera for NCAP
- Surround View with 3D visualization
- Driver and Occupant Monitoring System
- Lidar System
- Intelligent Survey Camera
- Robotics

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Industrial Applications

Key Features

- 4 Arm[®] Cortex[®]-A53 : 9.2 kDMIPS
- Dual Cortex-R7 LockStep cores to run AUTOSAR : 2kDMIPS
- Overall Tops performance : 7,2 TOP :
 - CNN IP
 - Multi-Threading Computer Vision Engine
 - HW Accelerator: optical flow, object detection, ...
- Integrated ISP with up to 8 Mpixel sensors, RGB-IR support
- Automotive Interface; Ethernet AVB, CAN FD н. and FlexRay
- ASIL D devel. process for systemtic capability for the full SOC
- Supporting metric targets for ASIL B (sensor layer, application processors) and ASIL C (realtime Domain) safety goals

liagram					Functional Safety ASIL- B / C
Applicatio	on CPU		Image pipeline	Memory I/F	Connectivity
ARM Carter AIS	Neon		2x MIPI-CSI2-input 4L D-PHY[1,6Gbps]	32bit LPDDR4-3200	1x PCIe Rev2.0 (2L)
4x ARM® Cortex® A53			2x ISP 533MHz	Inline ECC + DRAM cache	IPC (320Mbps)
					FlexRay 2ch
		Video Codec	2x IMR-RS ext. 400MHz 3x IMR std 400MHz		AURORA (PCIe)
		iVCP1E/H.264 encoder YUV420/8bit: 1920 x 1080p x 60 fps	1x Display Unit	2x QSPI (1x Hyperflash)	Ethernet 1x Gbit AVB 1x Gbit Std port
Real-time CPU			1x OLDI/dRGB output	1x eMMC	3xCAN2.0B/CAN-FD
Lockstep ARMO Cortex/0/R7 BOOMHz / J2DMIPS		Computer vision & Deep Learning accelerators			4x UART 6x SPI 7x I ² C
			2x Slim iDMA 2vc 533MHz		
			2x iDMA 2vc 533MHz	CNN-IPv2	Package
System		1x STV 533MHz	1x PSC 4ch 533MHz	HW accelerator	FCBGA 538 pins
Security control (ICU-MX)	SYSRAM (384kB)	5x ACF 533MHz	5x IMP cores 533MHz		21x21mm,0.8mm pitch
Power domain control	RT-SRAM (1MB)		5x CVe ^{v1.1} 32thr 533MHz	533Mhz	
Thermal Sensor	JTAG Debug (Coresight)	1x DOF 533MHz	IMPC 2MB		

RENESAS R-CAR V3H

Benefits

- R-Car V3H is tailored for the Intelligent Camera System use case, balancing Innovation and automotive constraint
- Overall performance of 7,2 TOPS, capable of handling any state-of-the-art neural networks
- Integrated ISP supporting majors Sensor Vendors ICs drastically reduce system BOM. 8 Mpixel Sensor enable V3H to be use for Level 3 while support of the latest RGB-IR standard make V3H ideal for Driver Monitoring system
- ASIL certified SOC reduce SW development effort and remove the need additional redundant SOC
- Real time ASIL C CPU core avoiding the need of external MCU to handle Realtime task and Autosar
- Integrated development environment enables fast time-to-market for computer vision & deep learning-based solutions
- Renesas Provide PMIC specially developed for R-Car V3H allowing optimized power management in ASIL environment
 - Wide Partners Ecosystem, providing HW tools, Perception System for Camera, Lidar and Sensor Fusion with Radar

Condor Development board

- NOR flash memory
- LPDDR4-SDRAM for DBSC4
- DMI output connector for LVDS
- Camera input connectors
- eMMC memory for MMC
- PCIE x 4 connectors (2 lanes) for PCIE
- Ethernet n CAN, FklexRay
- Power supply : 12.0-V DC input

Packages include

- Evaluation Board
- Power Supply
- CD with User's Manual

Software

- Linux BSP (Linux.Org)
- Boot SW

SW Development Environment



- 64 Mbytes Hyper Flash & 64 Mbytes QSPI Flash
- 16 GBytes eMMC

V3H Starter Kit

- HDMI, RGB, LVDS, MipiCSI2, EthernetAVB, CAN
- JTAG, Debug Interface
- On board Connector with SOC signals
- Packages include
 - Starter Kit
 - Power Supply
 - USB & HDMI Cable
- Software
 - Linux BSP (Linux.Org)
 - Configuration tools
 - Mimi Monitor





HW Ordering Reference

Renesas Board	Product Name	Reference	Comment
	Condor Evaluation Board	RTP6A77980ASKB0CW0SA001#WS	Japan Order Code
		Y-RCAR-V§HCONDOR-I-BRD-WS20	Europe Order Code
	V3H Starter Kit	Y-ASK-RCAR-V3H-WS20	Global Order Code
Partner Board	Product Name	Description	Company
	eCube	Development Platform for V3H & V3H2 Intelligent camera application	eST
	VIDEOBOX (MINIPLUS)	Development Platform for V3H Intelligent camera application	Cogent

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